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PHILIPS

PAL COLOUR ENCODER

PM5545

9499 490 05911

1/1071/1/01

MP MASTER
MA24525

PHILIPS

OPERATING MANUAL

PAL COLOUR ENCODER

PM5545

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PHILIPS

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1. Introduction

The PAL colour encoder PM 5545 is a compact, high stability general purpose instrument for use in TV laboratories and production centres as well as in studios.
It contains a number of features such as separate luminance input and output, adjustable burst amplitude and subcarrier phase, switchable Y, R-Y and B-Y signals etc.

Together with the Colour TV Sync Generator PM 5532 it gives a complete colour processing unit, which fits in a 19" cabinet.
The colour encoder is available in the following versions:

PM 5545G	encoding the signals according the CCIR system PAL-G.
PM 5545M	encoding the signals according the CCIR system PAL-M.
PM 5545N	encoding the signals according the CCIR system PAL-N.

II. Technical data

Properties expressed in numerical values with stated tolerances are guaranteed by us. Numerical values without tolerances represent the properties of an average instrument.

A. Input levels

Input A: Y, R, G and B signals	: 0.7 V_{p-p}, excl. sync. and set-up
Input impedance	: high-ohmic, looped through
Input B: Y signal	: 0.7 V_{p-p}, excl. sync. and set-up
(R-Y), (B-Y) signals	: 1.4 V_{p-p}, excl. sync. and set-up
Input impedance	: 75 Ω
Sync. and burst keying pulses	: 2 - 8 V_{p-p}, negative; max. superimposed hum 100 %
Input impedance	: high-ohmic, looped through
Subcarrier	: 1 - 4 V_{p-p}
Input impedance	: high-ohmic, looped through
Reflection loss for all inputs	: $\leqslant -35$ dB

B. Encoding

System	: PAL
Luminance signal	: $E_y = 0.299\ E_R + 0.587\ E_G + 0.114\ E_B$
Matrixing inaccuracy	: < 1 %
Chrominance signals	: $E_u = 0.493\ (E_B - E_Y)$ $E_v = 0.877\ (E_R - E_Y)$
Input crosstalk between all inputs	: $\leqslant 50$ dB
Burst amplitude	: 300 mV_{p-p} nominal; adjustable from 0-200 %

C. Modulators

Unbalance	: < 1 %; typical < 0.5 %
Phase inaccuracy	: $\pm 0.5^{o}$
Subcarrier phase	: 0^{o}–360^{o}, adjustable on frontplate
Temperature drift of subcarrier phase	: 2^{o}

D. Frequency response

Luminance channel	: up to 6 MHz ⩽ 0.5 dB up to 10 MHz ⩽ 3 dB
Notch filter (switchable)	: 6 dB at 4.43 MHz < 3 dB at 4.43 MHz ± 200 kHz
Chrominance channel	: 4.43 MHz ± 1.4 MHz < 3 dB 4.43 MHz ± 4 MHz > 20 dB

E. Distortion

Differential gain	: < 0.5 %
Differential phase	: < 0.5°
Time difference between (R-Y) and (B-Y) signals	: < 10 ns
Time difference between luminance and chrominance signals (measured with a 20T-pulse)	: < 15 ns

F. Pulse response

Luminance channel:	
rise time	: t_r < 55 ns
ripple	: < 1 % (measured via a 100 ns Thomson filter)
Chrominance channel:	
rise time	: t_r appr. 225 ns
ripple	: < 1 %

G. Outputs

Two separate output amplifiers with 2 outputs each.

Amplitude	: 1 V_{p-p} incl. sync.
Output impedance	: 75 Ω

H. Temperature range

Operating conditions	: 0 - 40 °C

I. Power supply

Mains voltage	: 115/230 V ±20 %
Mains frequency	: 48 - 62 Hz
Power consumption	: 25 W at 230 V
Fuse	: For 115 V range: 600 mA, delayed action For 230 V range: 300 mA, delayed action

K. Mechanical data

Width	: 3/6 module in PHILIPS universal 19" system
Height	: 132 mm (3 units)
Depth	: 435 mm
Weight	: 5.5 kg (without cabinet)

III. Accessories

1 Operating manual
1 Mains flex
7 75 Ω-connectors
4 BNC connectors
2 Extension board, enabling measurements in the instrument when it is in operation.

N.B.: The PM 5545 is delivered without cabinet.
A 3/6 module cabinet can be ordered with typenumber PM 9713.
The encoder fits together with the colour TV Sync. Generator PM 5532 in a 6/6 module cabinet PM 9716.

IV. Description of the blockdiagram

The necessary controlling signals viz: sync, burst key and subcarrier should be supplied by e.g. the PHILIPS colour TV sync. generator PM 5532.

The sync. and burst key inputs are provided with regenerators which secure proper signals to the encoder in case of hum or distortion.

The encoder has inputs for (Y) RGB signals as well as for R-Y, B-Y and Y signals.

Input A (RGB input) can by means of SK3 "Y" be extended with a separate Y input (BU2-3) (when using 4 channels colour camera).

The RGB signals are via the respective input amplifiers applied to the Y matrix. Here the luminance signal for input A is formed as a $-Y$ signal.

The +R and +B signals are together with the $-Y$ signal applied to the (R-Y) and (B-Y) matrixes where the colour difference signals are obtained.

By means of the switches SK7-8 and 9 connected to the successive amplifiers the three signals Y, R-Y and B-Y can be suppressed.

SK4 is the input selector for channel A.

When SK7 "$-Y$" is activated the Y signal is substituted with 50 % luminance. This is obtained in the active line period (52 μs) by means of the BK pulse in the circuits:

"Δt 2.4 μs", "Δt 52 μs" and "50 % lum.-level".

The signals from input B (R-Y) (B-Y) and Y are applied to the respective input amplifiers.

SK7-8 and 9 connected to the amplifiers have the same function as in input A. SK5 is the input selector for channel B.

From the input amplifiers the signals are applied to the same points as the difference signals from input A. At this point also the burst gating pulses derived from the burst keying pulses (BU5-10) are added.

In the burst splitter the negative pulse for B-Y and the positive pulse for R-Y are obtained.

By means of R1/SK2 in the following ampl/phase circuit the "BURST AMPLITUDE" can be changed between 0 - 200 %.

In pos. "NOM" (SK2) the burst amplitude is 100 % ($\sim$ 300 $mV_{p\text{-}p}$/75 Ω).

SK10 "PAL OFF" stops the burst alteration and the phase of burst remains at 180° (with the same burst amplitude).

Via the following amplifiers the difference signals are applied to the 1.7 MHz low-pass filters.

As the signals are a.c. coupled the d.c. is restored in the following clamping circuit by means of the line sync. (f_H).

The incoming subcarrier is via an input amplifier applied to the phase shift circuit where by means of R2 (SUBCARRIER PHASE) the phase can be shifted from 0 - 360 ° with respect to the applied "SUBC" signal.

The following limiter secures a fixed amplitude and a proper sine shape. By means of the two phase shift circuits (+45 ° and -45 °) the desired 90 ° phase difference between the two subcarrier signals to the modulators is obtained.

According to the PAL system the subcarrier to the R-Y modulator should be phase inverted 180 ° line sequentially.

This phase alternation is obtained in the F.F. circuit.

The circuit is controlled by the line pulses (f_H).
The "PAL switch control" secures by means of field pulses and burst key pulses that the burst will be suppressed 9 lines during the field blanking period, and that the first and last burst phase (R-Y phase) in a field will be positive.

SK10 "PAL OFF" stops the alternating of R-Y phase (NTSC burst).
The signals from the R-Y and B-Y modulators are applied to the chroma adder.
Via an amplifier and the 4.4 MHz band-pass filter the chroma signal is added to the Y signal (U3).

The Y signal to input A or B is applied to the notch filter via the Y clamping and an amplifier.
The filter having a resonance of 4.43 MHz suppresses the frequencies in the region embracing the subcarrier frequency.
The filter can be activated by SK6 "NOTCH FILTER".
The Y signal is delayed approx. 0.35 μs in the following circuit.
This is done to compensate for the corresponding delay in the chrominance low-pass filters.

For the same reason the supplied sync. signal is delayed (approx. 0.35 μs).
In unit 3 the output signal can be selected between "Y + sync.", "Y + chroma + sync." and "Y + chroma".
The selection is done by internal soldering.

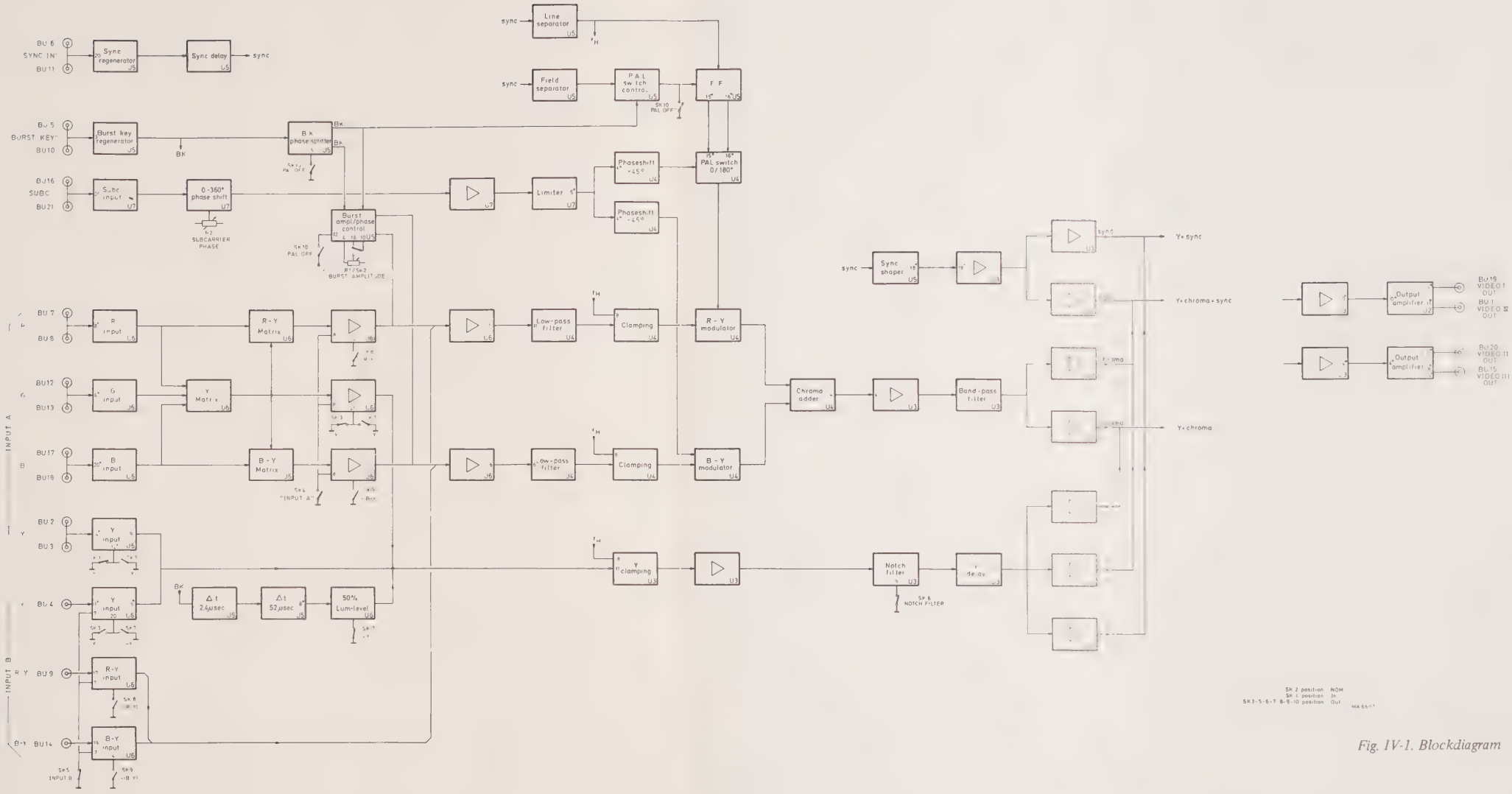


Fig. IV-1. Blockdiagram

V. Installation

A. Adjusting to the local mains voltage

The instrument can be used with mains voltages of 115 V and 230 V a.c. ±20 %.
Before using a new instrument check the adjustment.
If the instrument has to be adjusted to another mains voltage, resolder the connections to the primary windings of the supply transformer as shown in the figures below.

Fig. V-1. Adjusting to the local mains voltage

B. Earthing

Earth the instrument in accordance with the local safety regulations.
The metal cabinet can be earthed via socket BU24 (see fig. VI-2) and via the earthing core of the mains flex.
The electrical circuit can be earthed via socket BU23 (see fig. VI-2) and via the screening of the coaxial connection cables.
Avoid double earthing of the electrical circuit, because this may introduce hum phenomena.

C. Mounting in a cabinet

The instrument can be mounted either in a 3/6 module cabinet PM 9713 or, together with the colour TV Sync. Generator PM 5532 forming a complete colour processing unit, in a 19" cabinet PM 9716 (6/6 module).

D. Connecting the PM 5544 to the encoder PM 5545

The output signals Y, R-Y and B-Y should preferably be used to prevent double matrixing when applying the video signals.

The following adjustments (see Fig. V-2) should be carried out for correct encoding:

1. Connect an oscilloscope to one of the outputs BU20 "VIDEO II OUT" or BU15 "VIDEO III OUT" of PM 5545 and terminate with 75 Ω.
2. Adjust R1 unit 14B of PM 5544 (Y amplitude) to 1 V_{p-p} including sync.
3. The peak levels of yellow and cyan should be equal to white.
   If that is not the case, adjust R1 unit 14A of PM 5544 (B-Y amplitude) until the yellow amplitude is correct and R16 unit 14A of PM 5544 (R-Y amplitude) until the cyan amplitude is correct.

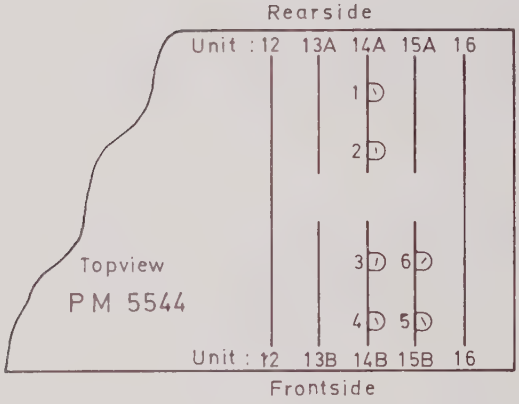


Fig. V-2. Adjusting elements

Adjusting elements

1. (R1 - unit 14A) - B - Y amplitude
2. (R16 - unit 14A) - R - Y amplitude
3. (R1 - unit 14B) - Y amplitude
4. (R16 - unit 14B) - G amplitude
5. (R16 - unit 15B) - B amplitude
6. (R1 - unit 15B) - R amplitude

VI. Survey of controls and sockets

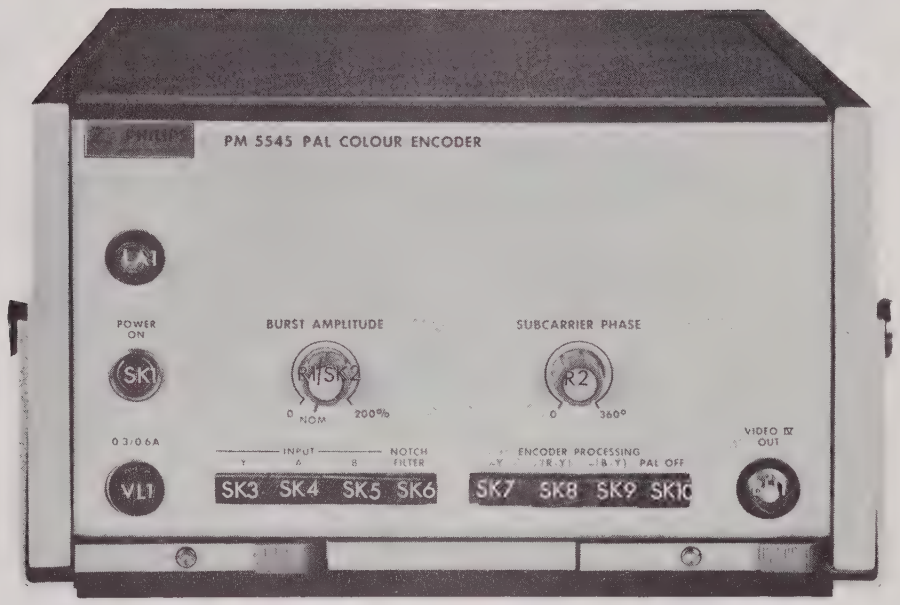


Fig. VI-1. Front of the instrument

A. Front of the instrument

LA1 Pilot lamp; lights up when the instrument is switched on.

SK1 "POWER ON"
Mains switch; the instrument is switched on if the lever of the switch is placed upwards.

R1/SK2 "BURST AMPLITUDE"
Control for the amplitude of the burst signal. When turning fully counter clockwise (position "NOM.") SK2 is switched and the burst has its nominal value.

R2 "SUBCARRIER PHASE"
Control to introduce a phase difference between the applied external subcarrier signal and the modulation phase of the chrominance signal in the encoded output signal.

SK3 "INPUT Y"
Push-button controlling the Y-input of INPUT A (looped-through sockets BU2, BU3). Should be pressed together with push-button SK4 "INPUT A", when a Y-R-G-B signal should be encoded.

SK4 "INPUT A"
Push-button controlling input A (looped-through input sockets BU7, BU8 (R), BU12, BU13 (G) and BU17, BU18 (B).
When pressed the applied R-G-B-signal is encoded.
When a Y-R-G-B-signal should be encoded push-button SK3 "INPUT Y" should also be pressed.

SK5	"INPUT B" Push-button controlling input B (75 Ω sockets BU4 (Y), BU9 (R-Y) and BU14 (B-Y). When pressed the applied Y, R–Y and B–Y signal is encoded.
SK6	"NOTCH FILTER" When pressed a notch filter (4.43 MHz) is inserted in the Y-channel.
SK7	"ENCODER PROCESSING –Y" When pressed the Y component in the encoded output signal is replaced by a 50 % luminance level. *
SK8	"ENCODER PROCESSING –(R–Y)" When pressed the (R-Y) component in the encoded output signal is suppressed.
SK9	"ENCODER PROCESSING –(B–Y)" When pressed the (B-Y) component in the encoded output signal is suppressed.
SK10	"ENCODER PROCESSING PAL OFF" When pressed the line sequential switching of burst and R–Y component is switched off. (amplitude burst remains constant).
BU1	"VIDEO IV OUT" Output socket for the encoded video signal.
VL1	Safety fuse: 230 V - 300 mA, delayed action type. 115 V - 600 mA, delayed action type.

* The field blanking of the artificial 50 % luminance signal is not according to the TV standard.

B. Rear of the instrument

BU2, BU3	"Y" Looped-through input sockets for the luminance signal of input Y.
BU4	"Y" 75 Ω terminated input socket for the luminance signal of input B.
BU5, BU10	"BURST KEY" Looped-through input sockets for the burst keying pulses.
BU6, BU11	"SYNC." Looped-through input sockets for the sync. signal.
BU7, BU8	"R" Looped-through input sockets for the red signal of input A.
BU9	"R–Y" 75 Ω terminated input socket for the (R–Y) signal of input B.
BU12, BU13	"G" Looped-through sockets for the green signal of input A.
BU14	"B-Y" 75 Ω terminated input socket for the (B–Y) signal of input B.
BU15	"VIDEO III OUT" Output socket for the encoded video signal.

BU16, BU21 "SUBCARRIER"
Looped-through input sockets for the subcarrier signal.

BU17, BU18 "B"
Looped-through input sockets for the blue signal of input A.

BU19 "VIDEO I OUT"
Output socket for the encoded video signal.

BU20 "VIDEO II OUT"
Output socket for the encoded video signal.

BU22 " ⏚ "
Earthing socket for connected to the electrical circuit.

BU23 " ⏚ "
Earthing socket for connected to the metal cabinet.

BU24 Mains socket.

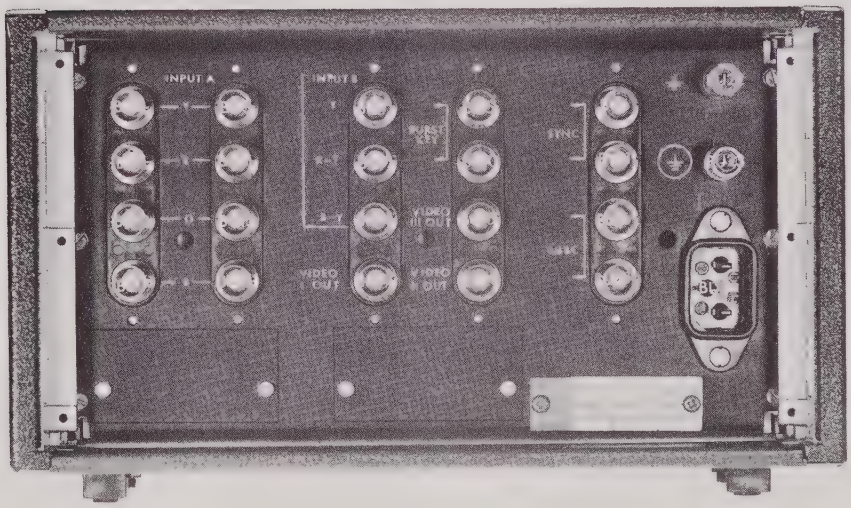
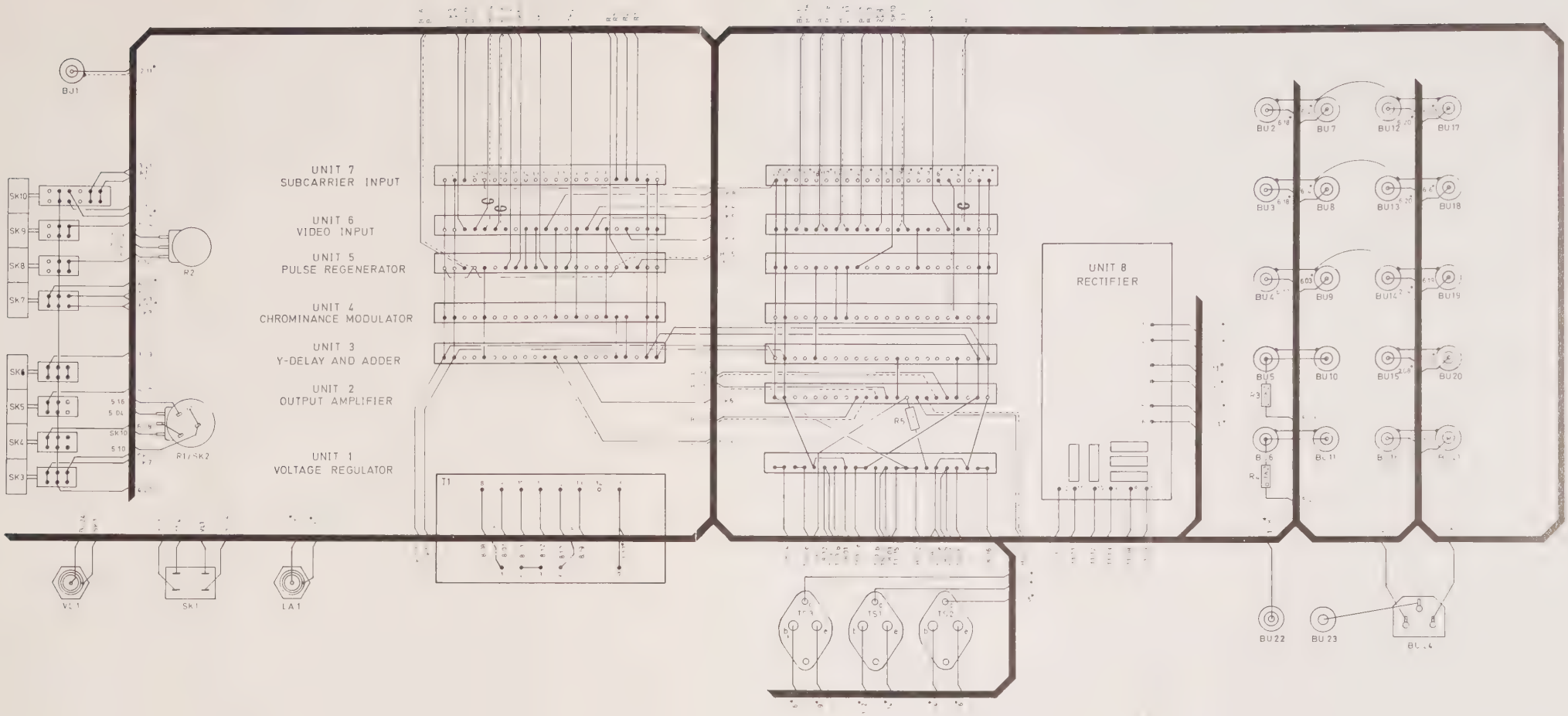
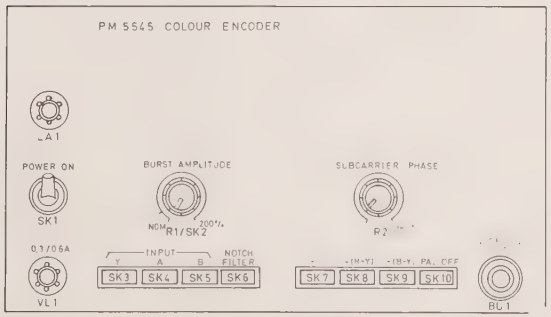


Fig. VI-2. Rear of the instrument





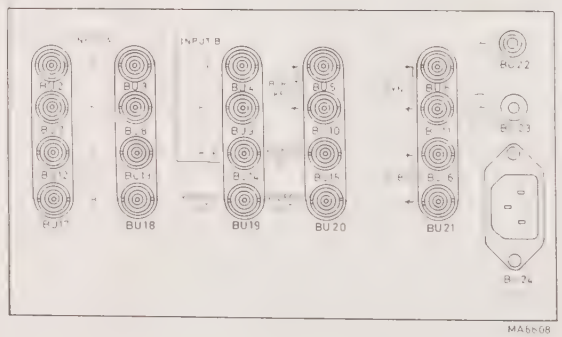


Fig. VII-1. Wiring diagram

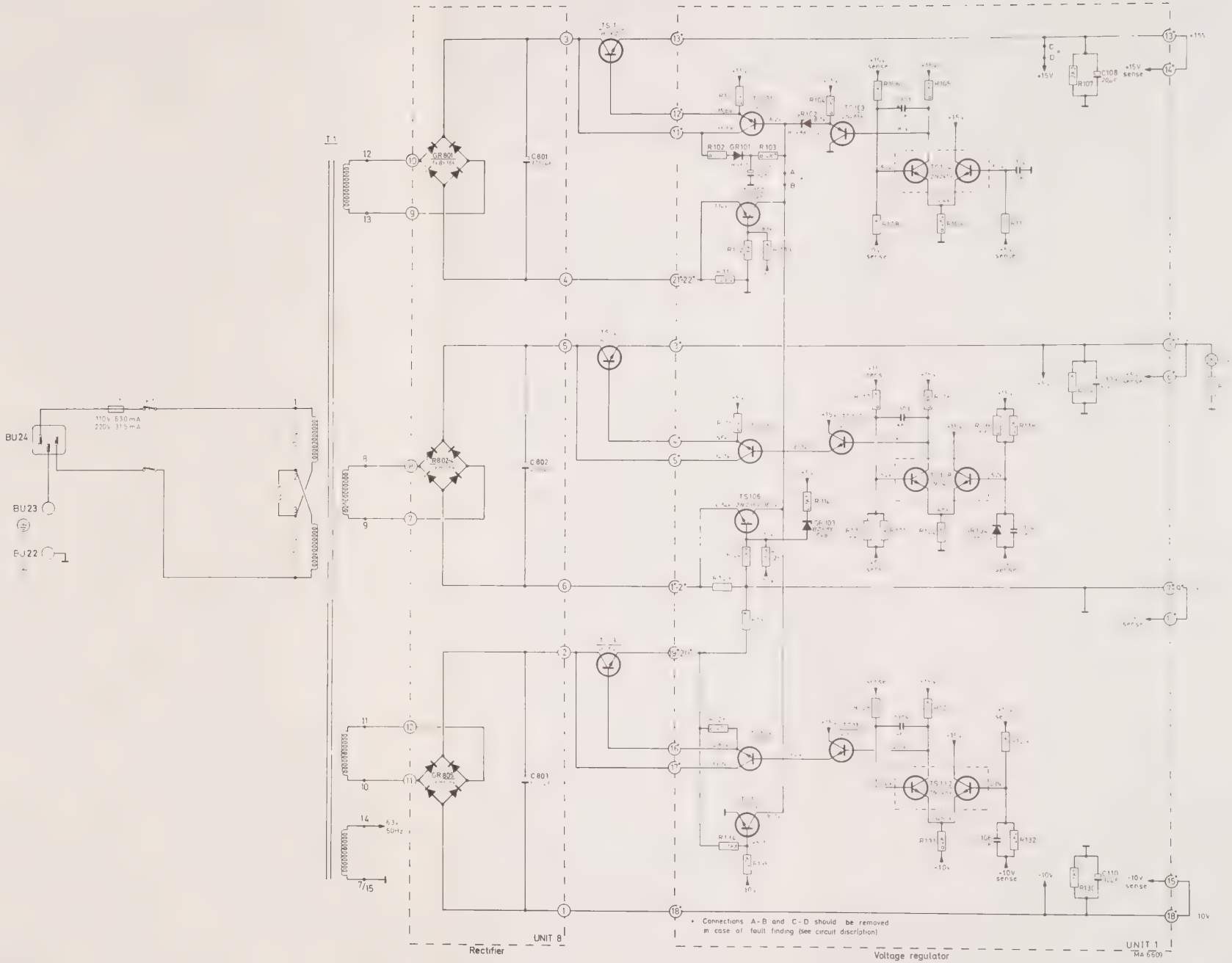


Fig. VII-2. Power supply, unit 1 and unit 8

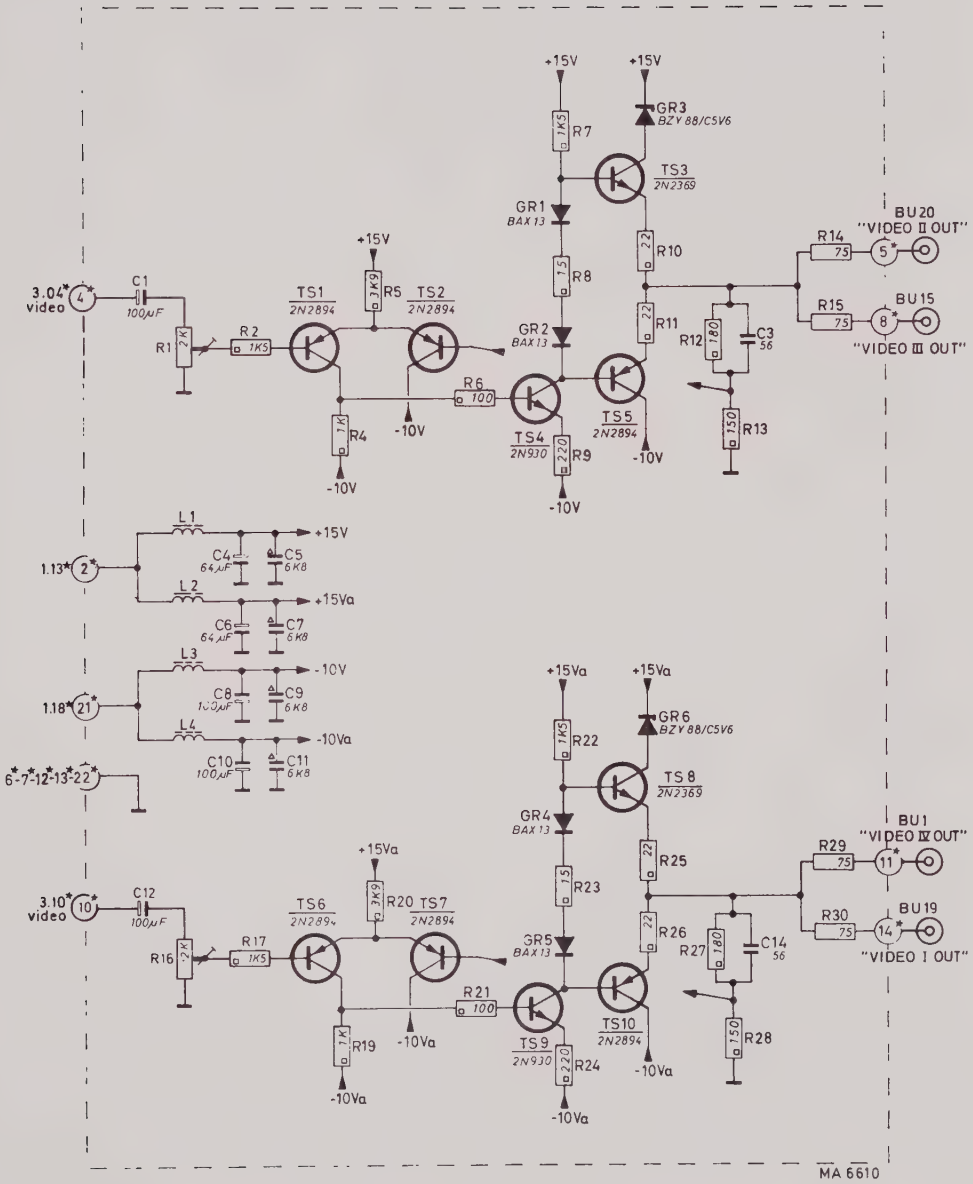


Fig. VII-3. Output amplifier, unit 2

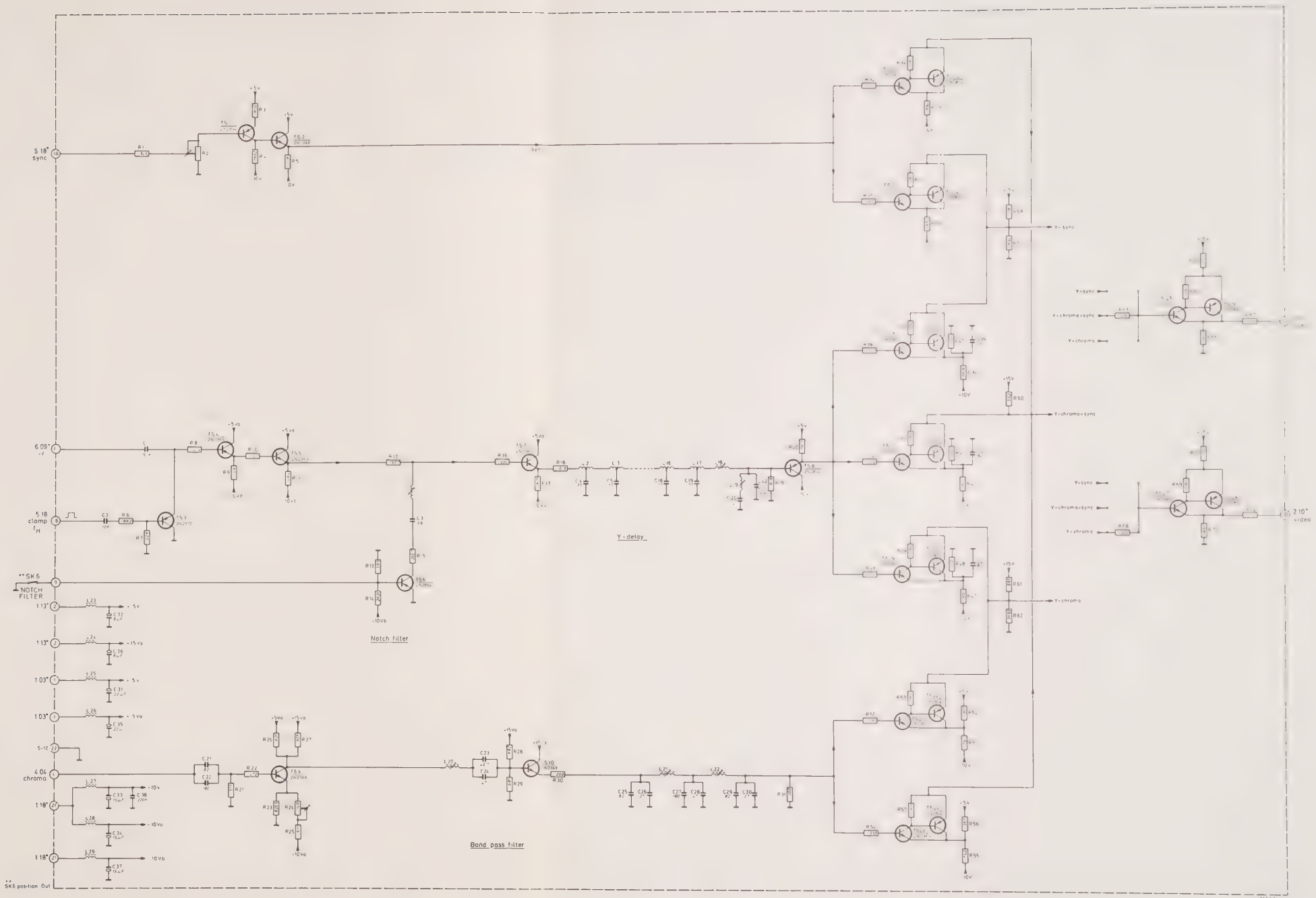


Fig. VII-4. Y-delay and adder, unit 3

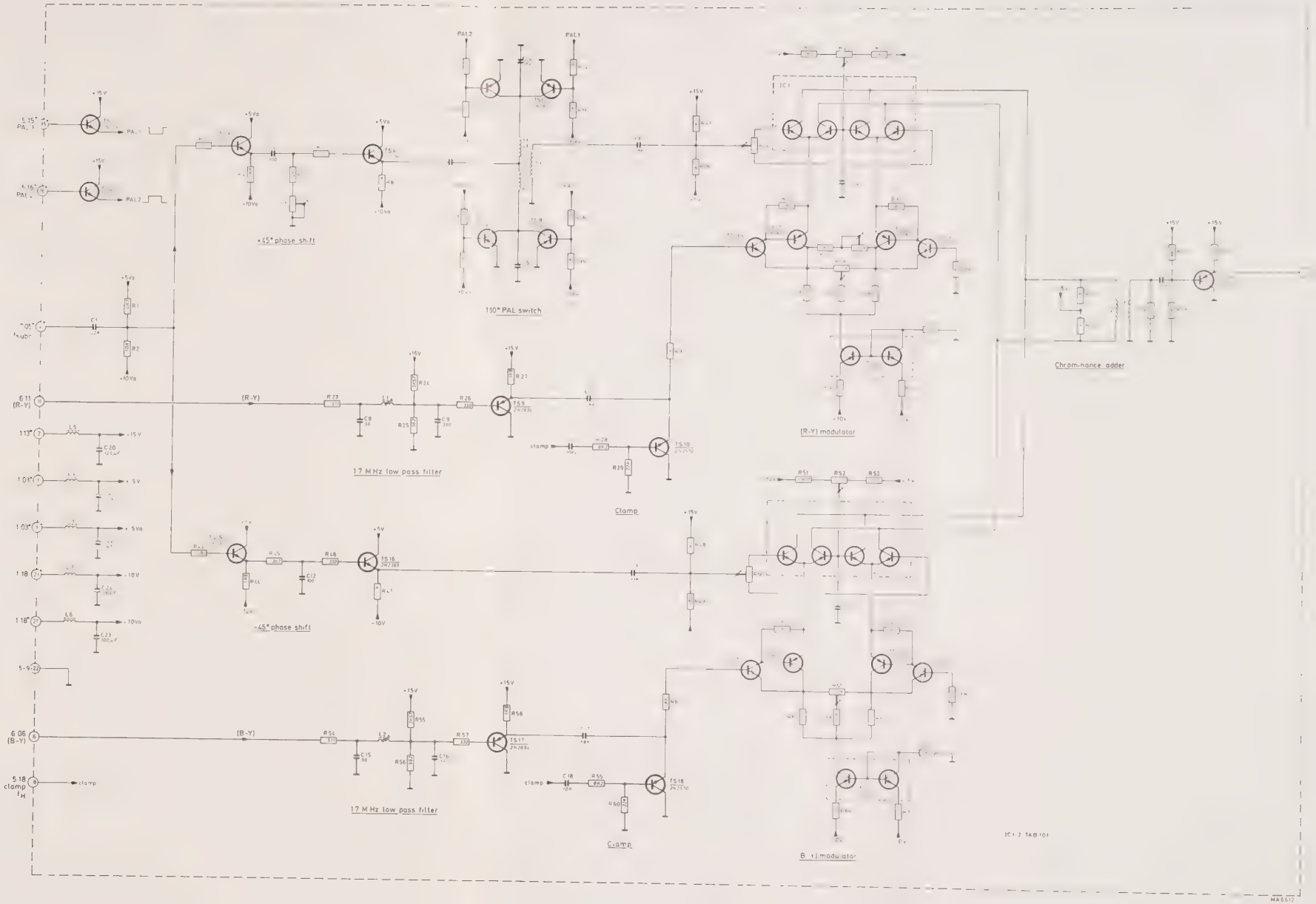


Fig. VII-5. Chrominance modulator, unit 4

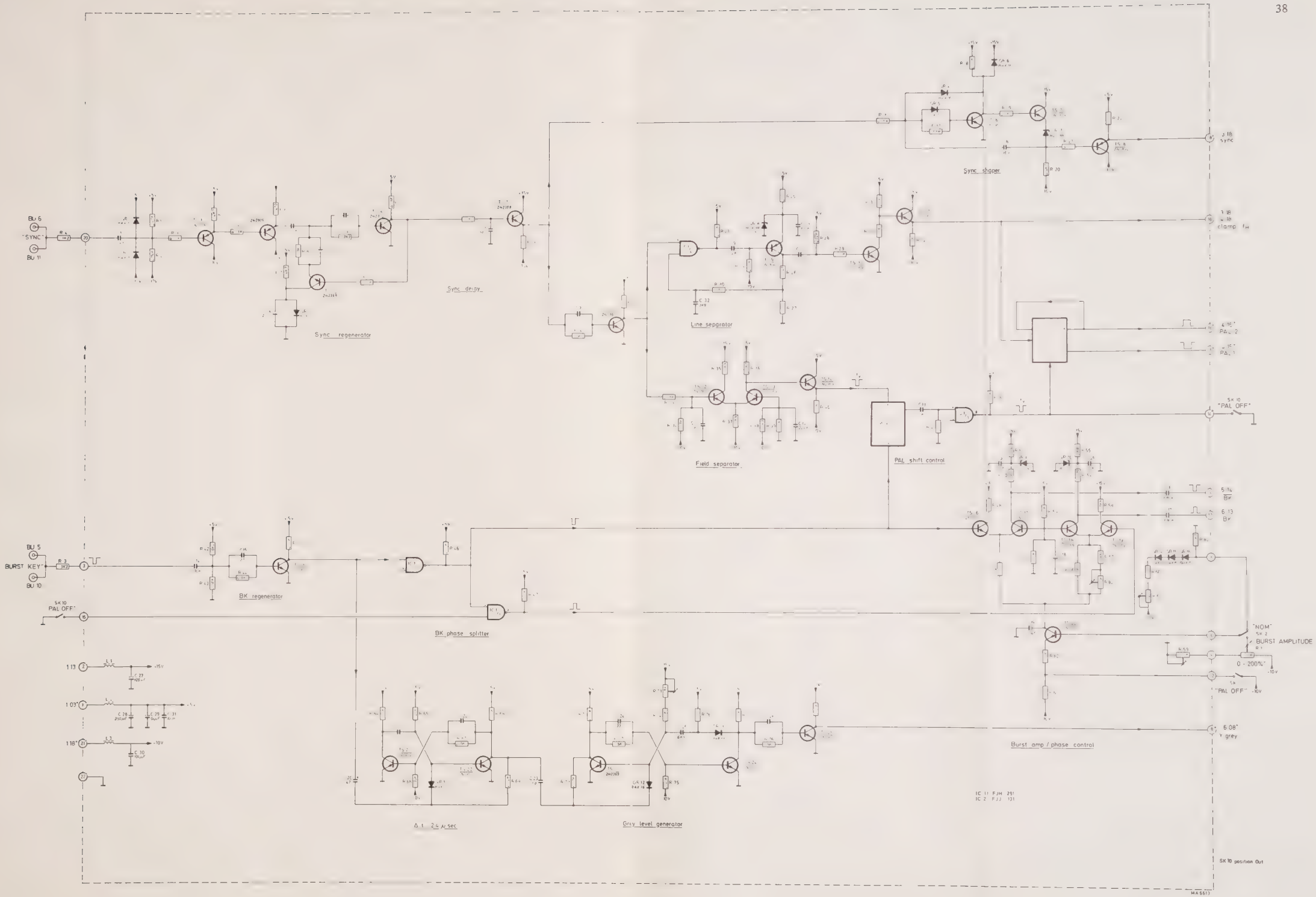
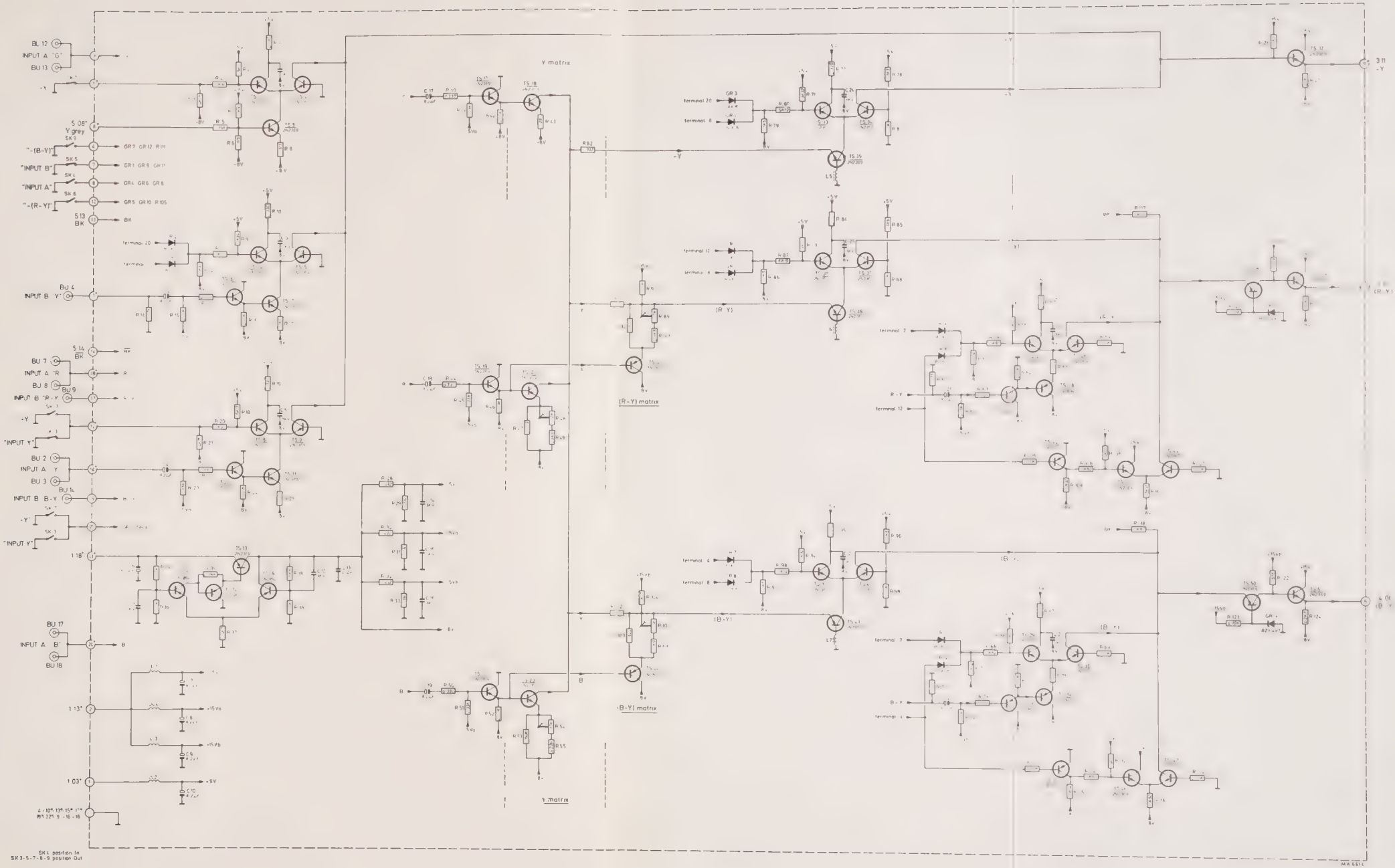


Fig. VII-6. Pulse regenerator, unit 5


Y matrix
(R-Y) matrix
(B-Y) matrix
Y matrix
INPUT A "G"
INPUT B "-(B-Y)"
INPUT A "B"
INPUT B "-(R-Y)"
INPUT A "R"
INPUT B "-R-Y"
INPUT A Y
INPUT B B-Y
INPUT A "B"
INPUT B "-(B-Y)"
INPUT B B-Y

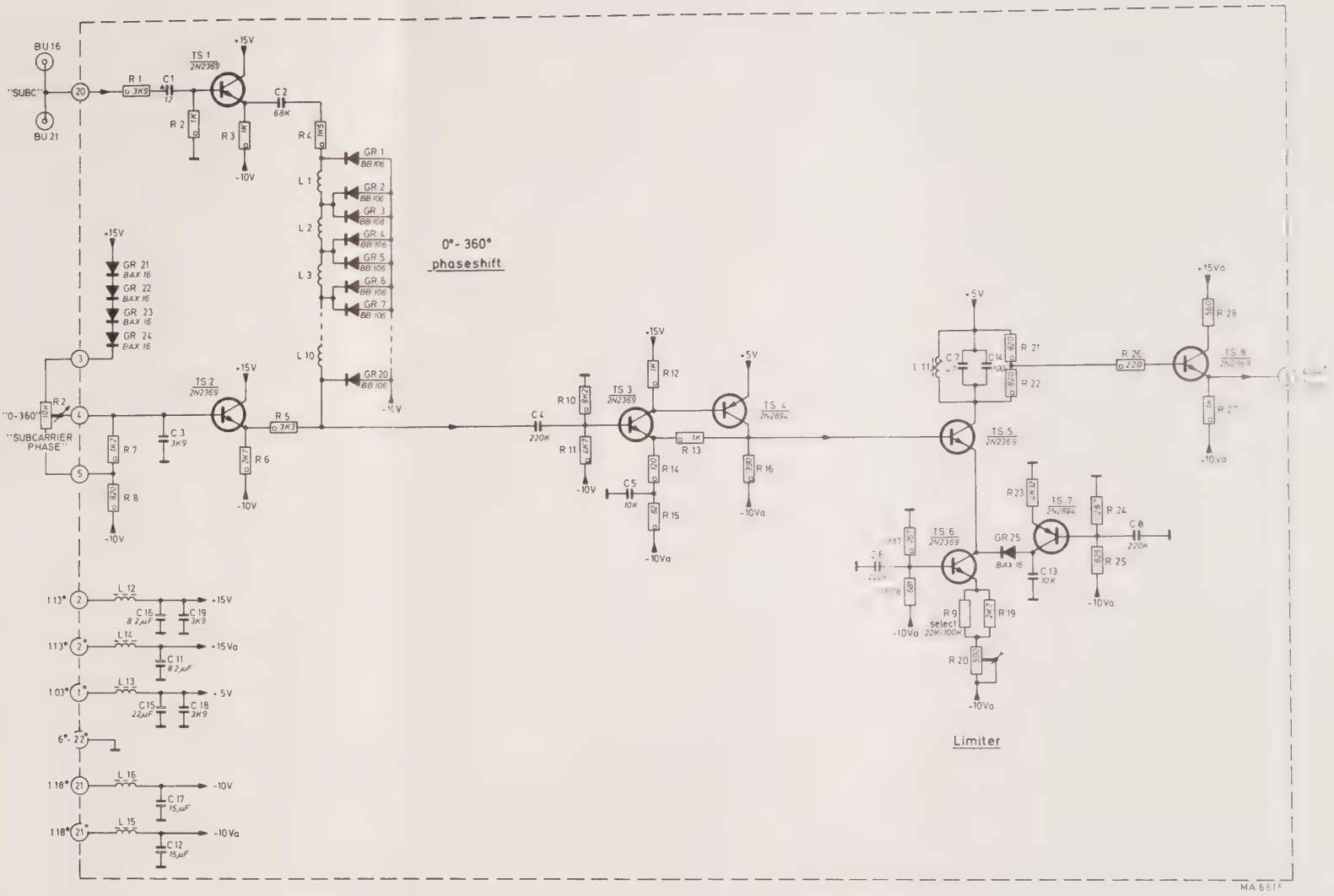


Fig. VII-8. Subcarrier input, unit 7

VIII. List of spare parts

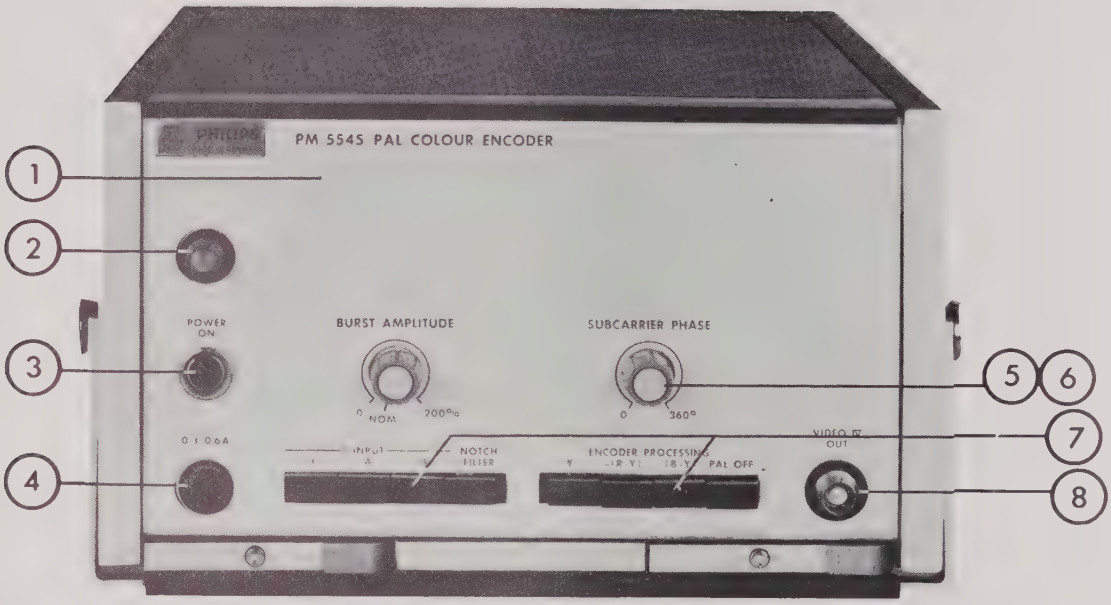


Fig. VIII-1. Front view

A. Mechanical

Item	*Quantity*	*Description*	*Ordering number*
1	1	Textplate	5322 455 74008
2	1	Control lampholder	5322 255 10078
2	1	Pilot lamp	5322 134 40264
3	1	Mains switch	5322 277 10226
4	1	Fuse holder	5322 256 40039
4	1	Fuse 230 V/T 300 mA	5322 253 30014
4	1	Fuse 115 V/T 600 mA	5322 253 30018
5	2	Knob	5322 413 30082
6	2	Cap for knob	5322 413 70038
7	1	Pushbutton unit	5322 267 84013
8	21	BNC-socket	5322 267 10004
9	5	Connector plate	4822 466 90687
		BNC connector	5322 265 10003
10	1	Earth connector (chassis)	4822 290 40011
11	1	Earth connector (electrical)	4822 290 40012
12	1	Mains socket	5322 265 30066
	1	Mains flex	5322 321 10071
		75 Ω-connector	5322 263 60033
	1	Allen key	5322 395 50085

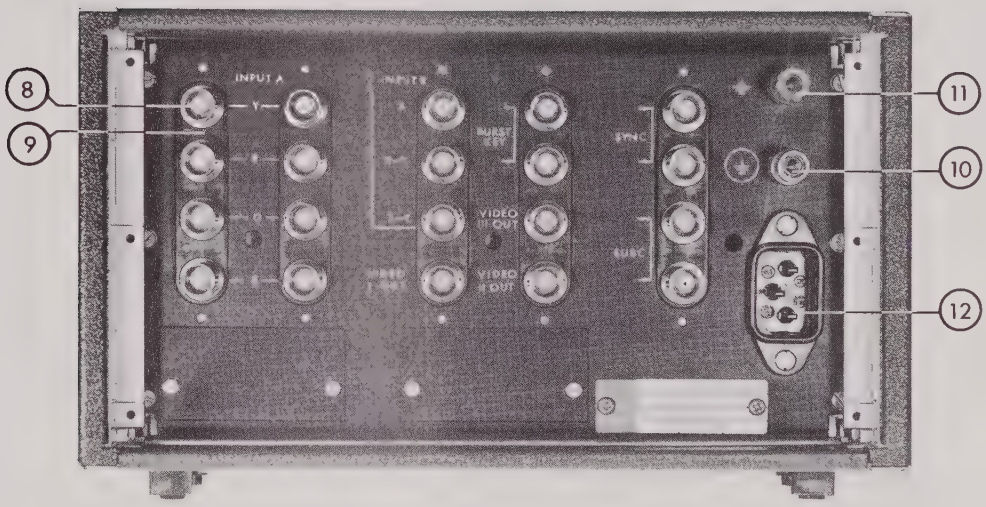


Fig. VIII-2. Rear view

B. ELECTRICAL — ELEKTRISCH — ELEKTRISCH — ELECTRIQUE — ELECTRICOS

This parts list does not contain multi-purpose and standard parts. These components are indicated in the circuit diagram by means of identification marks. The specification can be derived from the survey below.

Diese Ersatzteilliste enthält keine Universal- und Standard-Teile. Diese sind im jeweiligen Prinzipschaltbild mit Kennzeichnungen versehen. Die Spezifikation kann aus nachstehender Übersicht abgeleitet werden.

In deze stuklijst zijn geen universele en standaardonderdelen opgenomen. Deze componenten zijn in het principeschema met een merkteken aangegeven. De specificatie van deze merktekens is hieronder vermeld.

La présente liste ne contient pas des pièces universelles et standard. Celles-ci ont été repérées dans le schéma de principe. Leurs specifications sont indiquées ci-dessous.

Esta lista de componentes no comprende componentes universales ni standard. Estos componentes están provistos en el esquema de principio de una marca. El significado de estas marcas se indica a continuación.

Carbon resistor E24 series
Kohleschichtwiderstand, Reihe E24
Koolweerstand E24 reeks
Résistance au carbone, série E24
Resistencia de carbón, serie E24
} 0,125 W 5%

Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
} 0,25 W ≦ 1 MΩ, 5%
> 1 MΩ, 10%

Carbon resistor E24 series
Kohleschichtwiderstand, Reihe E24
Koolweerstand E24 reeks
Résistance au carbone, série E24
Resistencia de carbón, serie E24
} 0,5 W ≦ 5 MΩ, 1%
> 5 ≦ 10 MΩ, 2%
> 10 MΩ, 5%

Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
} 0,5 W ≦1,5MΩ, 5%
>1,5MΩ, 10%

Wire-wound resistor
Drahtwiderstand
Draadgewonden weerstand
Résistance bobinée
Resistencia bobinada
} 10 W 5%

Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
} 1 W ≦2,2 MΩ, 5%
>2,2 MΩ, 10%

Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
} 2 W 5%

Wire-wound resistor
Drahtwiderstand
Draadgewonden weerstand
Résistance bobinée
Resistencia bobinada
} 0,4 – 1,8 W 0,5%

Wire-wound resistor
Drahtwiderstand
Draadgewonden weerstand
Résistance bobinée
Resistencia bobinada
} 5,5 W ≦ 200 Ω, 10%
>200 Ω, 5%

Tubular ceramic capacitor
Rohrkondensator
Keramische kondensator, buistype
Condensateur céramique tubulaire
Condensador cerámico tubular
} 500 V

Tubular ceramic capacitor
Rohrkondensator
Keramische kondensator, buistype
Condensateur céramique tubulaire
Condensador cerámico tubular
} 700 V

Ceramic capacitor, "pin-up"
Keramikkondensator "Pin-up" (Perltyp)
Keramische kondensator "Pin-up" type
Condensateur céramique, type perle
Condensador cerámico, versión "colgable"
} 500 V

"Microplate" ceramic capacitor
Miniatur-Scheibenkondensator
"Microplate" keramische kondensator
Condensateur céramique "microplate"
Condensador cerámico "microplaca"
} 30 V

Mica capacitor
Glimmerkondensator
Micakondensator
Condensateur au mica
Condensador de mica
} 500 V

Polyester capacitor
Polyesterkondensator
Polyesterkondensator
Condensateur au polyester
Condensador polyester
} 400 V

Flat-foil polyester capacitor
Miniatur-Polyesterkondensator (flach)
Platte miniatuur polyesterkondensator
Condensateur au polyester, type plat
Condensador polyester, tipo de placas planas
} 250 V

Paper capacitor
Papierkondensator
Papierkondensator
Condensateur au papier
Condensador de papel
} 1000 V

Wire-wound trimmer
Drahttrimmer
Draadgewonden trimmer
Trimmer à fil
Trimmer bobinado

Tubular ceramic trimmer
Rohrtrimmer
Buisvormige keramische trimmer
Trimmer céramique tubulaire
Trimmer cerámico tubular

For multi-purpose and standard parts, please see PHILIPS' Service Catalogue.

Für die Universal- und Standard-Teile siehe den PHILIPS Service-Katalog.

Voor universele en standaardonderdelen raadplege men de PHILIPS Service Catalogus.

Pour les pièces universelles et standard veuillez consulter le Catalogue Service PHILIPS.

Para piezas universales y standard consulte el Catálogo de Servicio PHILIPS.

Printpanels

Unit	*Description*	*Print number*	*Ordering number*
1	Voltage regulator	4008 108 76110	5322 216 60209
2	Output amplifier	4008 108 75250	5322 216 60167
3	Y-delay and adder	4008 108 77090	5322 216 64023
4	Chrominance modulator	4008 108 76660	5322 216 64024
5	Pulse regenerator	4008 108 76650	5322 216 64025
6	Video input	4008 108 76910	5322 216 64026
7	Subcarrier input	4008 108 76640	5322 216 64027
8	Rectifier	4008 108 75380	5322 216 60171
	Extension board	4008 108 75310	5322 263 70057
	Extension board	4008 108 75570	5322 466 10216

Semi-conductors

Type	*Ordering number*	*Type*	*Ordering number*
BCY71	5322 130 40373	BAX13	5322 130 40182
BDY20	5322 130 40449	BAX16	5322 130 30273
2N930	5322 130 40051	BB106	5322 130 30769
2N2219	5322 130 40496	BY164	5322 130 30414
2N2369	5322 130 40407	BZX79/C5V1	5322 130 30767
2N2453A	5322 130 30187	BZY88/C4V7	5322 130 30264
2N2570	5322 130 40181	BZY88/C5V1	5322 130 30284
2N2894	5322 130 40018	BZY88/C5V6	5322 130 30193
2N2905	5322 130 40468	BZY88/C6V8	5322 130 30079
2N2920	5322 130 44023	BZY88/C7V5	5322 130 30287

Integrated circuits

Type	*Ordering number*
FJH291	5322 209 84089
FJJ131	5322 209 80065
TAB101	5322 209 80126

Diagram number	*Description*	*Value*	*Watt/Volt*	*Ordering number*
T1	Mains transformer			5322 146 40185
R1	Potentiometer	1 kΩ		5322 101 44001
R2	Potentiometer	10 kΩ		5322 101 20369
L1...L3	Bead			5322 526 14006
Unit 1				
C1	Capacitor	1 kpF		4822 120 20107
C2-C4-C6	Capacitor	10 kpF		4822 120 20134
C3-C5	Capacitor	4.7 kp		4822 120 20125
C7	Electrolytic capacitor	8 µF	40 V	5322 124 24013
C8	Electrolytic capacitor	20 µF	16 V	5322 124 24012
C9	Electrolytic capacitor	40 µF	6.4 V	5322 124 24027
C10	Electrolytic capacitor	32 µF	10 V	5322 124 24021
R6-R32	Resistor	2.21 kΩ	1 %	5322 116 50968
R8	Resistor	1.1 kΩ	1 %	5322 116 50518
R11	Resistor	2.2 Ω	10 %	5322 113 60079
R12-R24-R34	Resistor	1.82 kΩ	1 %	5322 116 50781
R17	Resistor	15 kΩ	1 %	5322 116 54001
R23	Resistor	1 Ω	10 %	5322 113 60062
R25	Resistor	13 kΩ	1 %	5322 116 50522
R28	Resistor	100 Ω	1 %	5322 116 50746
R29	Resistor	3.32 kΩ	1 %	5322 116 54005
R33	Resistor	1.8 Ω	10 %	5322 113 60073
R35	Resistor	26.7 kΩ	1 %	5322 116 50364
Unit 2				
C1-C8-C10-C12	Electrolytic capacitor	100 µF	10 V	5322 124 24024
C3-C14	Capacitor	56 pF		5322 122 30116
C4-C6	Electrolytic capacitor	64 µF	16 V	5322 124 24028
C5-C7-C9-C11	Capacitor	6.8 kpF		5322 120 20129
R1-R16	Potentiometer	2 kΩ		5322 101 14015
R14-R15-R19-R30	Resistor	75 Ω	1 %	5322 116 50918
L1-L2	Coil			5322 158 10052
Unit 3				
C1	Capacitor	150 kpF		5322 121 40231
C2	Capacitor	10 kpF		5322 121 40085
C3	Capacitor	68 pF		5322 122 30023
C4-C19	Capacitor	33 pF		5322 122 30016
C20	Capacitor	12 pF		5322 122 30032
C21	Capacitor	82 pF		5322 121 54003
C22-C27	Capacitor	180 pF		5322 121 50416
C23	Capacitor	4.7 pF		5322 122 30033
C24-C28	Capacitor	47 pF		5322 122 30008
C25-C29-C40-C41	Capacitor	82 pF		5322 122 30015
C26-C30	Capacitor	27 pF		5322 122 30045
C31-C35	Electrolytic capacitor	22 µF	6.3 V	5322 124 10153
C32-C36	Electrolytic capacitor	8.2 µF	16 V	5322 124 10067
C23-C24-C37	Electrolytic capacitor	15 µF	10 V	5322 124 24008
C38	Capacitor	220 kpF		5322 121 40232
C39	Capacitor	56 pF		5322 122 30116

Diagram number	*Description*	*Value*	*Watt/Volt*	*Ordering number*
R1-R27	Resistor	825 Ω	1 %	5322 116 50978
R2	Potentiometer	500 Ω		5322 105 20007
R3-R39-R47	Resistor	1 kΩ	1 %	5322 116 50573
R4-R33-R36	Resistor	1.62 kΩ	1 %	5322 116 50949
R9	Resistor	22 kΩ	1 %	5322 116 50648
R11-R14-R17	Resistor	2.21 kΩ	1 %	5322 116 50968
R12-R15	Resistor	26.7 Ω	1 %	5322 116 54067
R13	Resistor	1.1 kΩ	1 %	5322 116 50518
R18-R19	Resistor	619 Ω	1 %	5322 116 50584
R20-R26	Resistor	1.21 kΩ	1 %	5322 116 50099
R21-R25-R65-R70	Resistor	511 Ω	1 %	5322 116 50659
R23	Resistor	82.5 Ω	1 %	5322 116 50563
R24	Potentiometer	100 Ω		5322 100 10128
R28	Resistor	1.82 kΩ	1 %	5322 116 50781
R29-R58-R61	Resistor	681 Ω	1 %	5322 116 50647
R30-R31	Resistor	200 Ω	1 %	5322 116 50267
R40-R44-R48	Resistor	221 Ω	1 %	5322 116 54002
R51-R55	Resistor	750 Ω	1 %	5322 116 50554
R56	Resistor	357 Ω	1 %	5322 116 50603
R59-R62	Resistor	3.92 kΩ	1 %	5322 116 54006
R60	Resistor	5.62 Ω	1 %	5322 116 54009
R66-R71	Resistor	1.5 kΩ	1 %	5322 116 50752
L1	Coil			5322 156 24015
L2, L17	Coil			5322 156 14009
L18	Coil			5322 156 24021
L19, L20	Coil			5322 156 24016
L21, L22	Coil			5322 156 24017
L23, L33	Coil			5322 158 10052
Unit 4				
C1-C19	Capacitor	22 kpF		5322 121 40308
C2-C12	Capacitor	100 pF		5322 121 54017
C3-C6-C10-C17	Capacitor	68 kpF		5322 121 40057
C4	Capacitor	60 pF		5322 125 50057
C5	Capacitor	33 pF		4822 120 10067
C7-C14	Capacitor	470. kpF		5322 121 40175
C8-C15	Capacitor	56 pF		4822 120 10074
C9-C16	Capacitor	390 pF		5322 120 60118
C11-C18	Capacitor	10 kpF		5322 121 40085
C13	Capacitor	33 kpF		5322 121 44025
C20	Electrolytic capacitor	125 μF		5322 124 24029
C21	Electrolytic capacitor	22 μF		5322 124 10153
C23-C24	Electrolytic capacitor	100 μF		5322 124 24024
C22	Capacitor	1 μF		5322 121 40177
R6-R19-R21-R50	Potentiometer	100 Ω		5322 100 10128
R5	Resistor	267 Ω	1 %	5322 116 50344
R17-R20-R48-R51	Resistor	2.67 kΩ	1 %	5322 116 50784
R18-R22-R49-R53	Resistor	825 Ω	1 %	5322 116 50978
R23-R54	Resistor	511 Ω	1 %	5322 116 50659
R24-R55	Resistor	3.57 kΩ	1 %	5322 116 50614

Diagram number	*Description*	*Value*	*Watt/Volt*	*Ordering number*
R30-R61-R68	Resistor	1.62 kΩ	1 %	5322 116 50949
R31-R32-R62-R63	Resistor	3.01 kΩ	1 %	5322 116 50121
R33-R42	Resistor	3.92 kΩ	1 %	5322 116 54006
R34	Potentiometer	10 kΩ		5322 103 10024
R25, R56	Resistor	562 Ω	1 %	5322 116 54009
R36-R65	Potentiometer	10 kΩ		5322 101 14012
R35	Resistor	332 Ω	1 %	5322 116 50416
R37	Resistor	15 kΩ	1 %	5322 116 50966
R40-R41-R69-R70	Resistor	301 Ω	1 %	5322 116 50786
R45	Resistor	357 Ω	1 %	5322 116 50603
R64-R67	Resistor	475 Ω	1 %	5322 116 50545
R66	Resistor	22.1 kΩ	1 %	5322 116 50648
R71	Resistor	4.75 kΩ	1 %	5322 116 54008
R72-R73	Resistor	1.5 kΩ	1 %	5322 116 50752
R74	Resistor	619 Ω	1 %	5322 116 50584
R75	Resistor	8.25 kΩ	1 %	5322 116 50979
R76	Resistor	5.62 kΩ	1 %	5322 116 50853
R77	Resistor	1.82 kΩ	1 %	5322 116 50781
L1-L2	Coil			5322 156 24022
L3-L7	Coil			5322 158 10052
T1	Transformer			5322 158 14012
T2	Transformer			5322 158 14013

Unit 5

C1	Capacitor	1 µF		5322 121 40197
C2-C31-C33-C34-C35	Capacitor	100 kpF		5322 122 40323
C3	Capacitor	82 pF		5322 122 30015
C4-C5	Electrolytic capacitor	8.2 µF		5322 124 10067
C6	Capacitor	5.6 pF		5322 122 30004
C7-C22-C24-C28	Capacitor	33 pF		5322 122 30016
C8	Capacitor	3.9 pF		5322 122 30003
C9	Capacitor	22 kpF		5322 121 50287
C10	Capacitor	820 pF		5322 121 50368
C11	Capacitor	2.2 kpF		5322 121 50415
C12-C18-C19	Electrolytic capacitor	22 µF		5322 124 10153
C13	Capacitor	1 kpF		5322 121 50424
C14-C21	Capacitor	330 kpF		5322 121 40257
C15	Capacitor	27 pF		5322 122 30045
C16-C17	Capacitor	0.68 µF		5322 121 40233
C20	Capacitor	47 pF		4822 120 10072
C23	Capacitor	68 pF		5322 122 30023
C25	Capacitor	6.8 kpF		5322 121 54005
C27	Electrolytic capacitor	125 µF		5322 124 24029
C28	Electrolytic capacitor	250 µF		5322 124 . . . . .
C29	Electrolytic capacitor	64 µF		5322 124 24028
C32	Capacitor	3.9 kpF		5322 122 30098
R26	Resistor	243 Ω	1 %	5322 116 50437
R27	Resistor	200 Ω	1 %	5322 116 50267
R49	Resistor	1 kΩ	1 %	5322 116 50747
R50-R54	Resistor	909 Ω	1 %	5322 116 50765

Diagram number	*Description*	*Value*	*Watt/Volt*	*Ordering number*
R56	Resistor	2.21 kΩ	1 %	5322 116 50968
R57	Resistor	6.87 kΩ	1 %	5322 116 51017
R59	Potentiometer	1 kΩ		5322 100 10129
R61	Potentiometer	200 Ω		5322 100 10155
R73	Potentiometer	5 kΩ		5322 100 10127
R74	Resistor	30.1 kΩ	1 %	5322 116 50121
R82	Potentiometer	10 kΩ		5322 101 14012
R83	Resistor	1.3 kΩ	1 %	5322 116 50526
L1-L3	Coil			5322 158 10052
Unit 6				
C1-C3-C5-C4 C12/C19-C21/C27	Capacitor	39 kpF		5322 122 30098
C2-C4-C10-C17 C20-C22	Electrolytic capacitor	8.2 μF		5322 124 10067
C13	Capacitor	0.47 μF	2 %	5322 121 40175
R1-R38-R40	Resistor	6.81 kΩ	1 %	5322 116 54012
R2-R18	Resistor	5.11 kΩ	1 %	5322 116 50762
R4-R20	Resistor	1.3 kΩ	1 %	5322 116 50526
R5	Resistor	15 kΩ	1 %	5322 116 54001
R6-R53-R78 · R79-R85-R96-R116	Resistor	1.5 kΩ	1 %	5322 116 50725
R7-R21	Resistor	4.75 kΩ	1 %	5322 116 54008
R8-R17-R25-R26	Resistor	511 Ω	1 %	5322 116 50659
R43	Resistor	280 Ω	1 %	5322 116 50955
R47	Resistor	619 Ω	1 %	5322 116 30584
R9-R16-R66-R106	Resistor	4.32 kΩ	1 %	5322 116 50794
R11-R58-R68-R108-R114-R117-R118	Resistor	1.82 kΩ	1 %	5322 116 50781
R12-R60-R70-R76 R83-R109-R115	Resistor	3.32 kΩ	1 %	5322 116 54005
R14-R61-R71	Resistor	75 Ω	1 %	5322 116 50554
R28-R30-R31	Resistor	432 Ω	1 %	5322 116 50976
R29-R31-R33 R82-R91-R102	Resistor	332 Ω	1 %	5322 116 50416
R34-R36-R39	Resistor	10 kΩ	1 %	5322 116 50748
R48-R89-R100	Potentiometer	2 kΩ		5322 100 10029
R54	Potentiometer	10 kΩ		5322 101 14012
R55	Resistor	22.1 kΩ	1 %	5322 116 50648
R65	Resistor	732 Ω	1 %	5322 116 50535
R75-R122	Resistor	576 Ω	1 %	5322 116 50363
R80	Resistor	6.19 kΩ	1 %	5322 116 50608
R81-R88-R91-R94	Resistor	1 kΩ	1 %	5322 116 50573
R92-R103	Resistor	594 Ω	1 %	5322 116 50732
R93	Resistor	2 kΩ	1 %	5322 116 50941
R104	Resistor	2.37 kΩ	1 %	5322 116 50594
R110	Resistor	1.91 kΩ	1 %	5322 116 54065
R119	Resistor	698 Ω	1 %	5322 116 54066
L1-L2	Coil			5322 158 10052

Diagram number	*Description*	*Value*	*Watt/Volt*	*Ordering number*
Unit 7				
C2	Capacitor	68 kpF		5322 121 44026
C4-C6-C8	Capacitor	220 kpF		5322 121 40232
C5-C13	Capacitor	10 kpF		5322 121 40085
C11-C16	Electrolytic capacitor	8.2 µF		5322 124 10067
C12-C17	Electrolytic capacitor	15 µF		5322 124 24008
C15	Electrolytic capacitor	22 µF		5322 124 10153
C18-C19	Capacitor	3.9 kpF		5322 122 30098
R17-R24	Resistor	267 Ω	1 %	5322 116 50344
R18	Resistor	681 Ω	1 %	5322 116 50359
R20	Potentiometer	500 Ω		5322 103 10052
R23	Resistor	4.32 kΩ	1 %	5322 116 50794
R25	Resistor	825 Ω	1 %	5322 116 50978
L1...L10	Coil			5322 156 24018
L11	Coil			5322 156 24019
L12-L16	Coil			5322 158 10052
Unit 8				
C1-C3	Electrolytic capacitor	1250 µF	40 V	5322 124 30069
C2	Electrolytic capacitor	2500 µF	25 V	5322 124 30009

QUALITY REPORTING

CODING SYSTEM FOR FAILURE DESCRIPTION

The following information is meant for Philips service workshops only and serves as a guide for exact reporting of service repairs and maintenance routines on the workshop charts.
For full details reference is made to Information G1 (Introduction) and Information Cd 689 (Specific information for Test and Measuring Instruments).

LOCATION

□□□
Unit number
e.g. 000A or 0001 (for unit A or 1; not 00UA or 00U1)

or: Type number of an accessory (only if delivered with the equipment)
e.g. 9051 or 9532 (for PM 9051 or PM 9532)

or: Unknown/Not applicable
0000

CATEGORY

□

0 Unknown, not applicable (fault not present, intermittent or disappeared)
1 Software error
2 Readjustment
3 Electrical repair (wiring, solder joint, etc.)
4 Mechanical repair (polishing, filing, remachining, etc.)
5 Replacement
6 Cleaning and/or lubrication
7 Operator error
8 Missing items (on pre-sale test)
9 Environmental requirements are not met

COMPONENT/SEQUENCE NUMBER

□□□□

Enter the identification as used in the circuit diagram, e.g.:

GR1003	Diode GR1003
TS0023	Transistor TS23
IC0101	Integrated circuit IC101
R0....	Resistor, potentiometer
C0....	Capacitor, variable capacitor
B0....	Tube, valve
LA....	Lamp
VL...	Fuse
SK....	Switch
BU....	Connector, socket, terminal
T0....	Transformer
L0....	Coil
X0....	Crystal
CB....	Circuit block
RE....	Relay
ME....	Meter, indicator
BA....	Battery
TR....	Chopper

Parts not identified in the circuit diagram:

990000	Unknown/Not applicable
990001	Cabinet or rack (text plate, emblem, grip, rail, graticule, etc.)
990002	Knob (incl. dial knob, cap, etc.)
990003	Probe (only if attached to instrument)
990004	Leads and associated plugs
990005	Holder (valve, transistor, fuse, board, etc.)
990006	Complete unit (p.w. board, h.t. unit, etc.)
990007	Accessory (only those without type number)
990008	Documentation (manual, supplement, etc.)
990009	Foreign object
990099	Miscellaneous

MP MASTER
MA24525